Congestion in Washington:
A Review of Causes and Potential Solutions

PRELIMINARY DRAFT FOR DISCUSSION ONLY

This preliminary draft discussion paper is a work product developed by the consulting team for review and discussion by the Blue Ribbon Commission on Transportation. The contents are intended to provide the Commission members with factual background information and a balanced set of policy alternatives, including the pros and cons of these alternatives. This paper is one of a series and should be reviewed in the context of the entire series that, when taken together, presents a comprehensive overview of the state's transportation system.

This discussion paper has been prepared primarily for Blue Ribbon Commission members new to these issues who wish to engage in a fundamental debate and for a more general audience of interested citizens who may wish to comment on the Commission's deliberations. This paper is intended to be provocative and to stimulate discussion of issues and options in this state. It questions the current ways of doing business, not for the sake of finding fault, but to allow consideration of other potential ways of thinking about transportation issues that might be appropriate in the future.

THE CONGESTION PROBLEM: INTRODUCTION AND OVERVIEW

In Washington State, traffic congestion wastes time and resources worth billions of dollars each year. Time lost to congestion delays has increased steadily throughout the 1980s and 1990s, especially in the Puget Sound region. Growth in population, increased intensity of vehicle use by the average person, a failure to build more roads or expand transit use, and a failure to make drivers pay the costs they generate when choosing to drive have resulted in roads on which peak-period demand outstrips capacity. As a result, the flow of traffic is increasingly inhibited; highways and streets become congested; and ultimately, Washington residents waste millions of hours each year in congestion-related delays.

Blue Ribbon Commission Efforts

The Investment Strategies Committee of the Blue Ribbon Commission on Transportation identified congestion as one of the key problems facing the state's transportation system.[1] To

[1] The other issue areas are 1) poor maintenance of existing streets, roads, and highways; 2) transportation "needs" that exceed funding; 3) land use and transportation conflicts; and 4) transportation and economic development. Each of these topic areas is the subject of a separate issue paper.

assist the Committee's decisions on potential recommendations, this paper provides an overview of the congestion problem and its potential solutions. It reviews direct and indirect causes of congestion and describes the extent of the congestion problem in Washington's urban areas.

Supply- and demand-side approaches can both address the congestion problem. Traditionally, planners and policymakers have addressed congestion by building more roads and adding transit capacity. An alternative or supplemental approach is to use policies such as congestion pricing, parking fees, gas taxes, or a variety of demand-management techniques to reduce demand for existing roads. This paper describes and evaluates a number of potential solutions to the congestion problem. These solutions are not an exhaustive list of potential strategies, but they encompass the key issues the Committee wanted to examine.

Supply-Side Solutions

- Build new or additional roads
- Add High-Occupancy Vehicle (HOV) lanes
- Employ High-Occupancy/Toll (HOT) lanes
- Expand bus transit
- Expand rail transit
- Employ intelligent transportation systems (ITS)

Demand-Side Solutions

- Use road pricing
- Cash out employer-provided parking
- Adopt more transportation demand management (TDM) policies
- Raise the gas tax

The paper evaluates the performance of these potential solutions on six criteria that the Investment Strategies Committee selected: 1) fixes the most critical problems first; 2) cost-effectiveness; 3) produces measurable change; 4) public acceptability; 5) administrative feasibility; and 6) maintains or enhances safety.

WHAT IS CONGESTION?

While the definition of congestion seems obvious to anyone stuck in a traffic jam, transportation analysts and planners use various methods to measure congestion. For a general definition of congestion, the recent efforts of the Washington State Department of Transportation's Congestion Relief Workgroup come as close as any:

> *Congestion* is an excess travel time or delay due to traffic interference above an agreed to norm.

Congestion typically concentrates around two peak time periods – one in the morning when commuters head to work and one in the evening when they return home. A large proportion of trips are commute trips. However, many trips made during peak periods are not commute trips; such trips include shopping and other activities as well as errands like trips to a daycare center or dry cleaner. Analysts use several different measures to characterize congestion; some are more precise or descriptive than others.

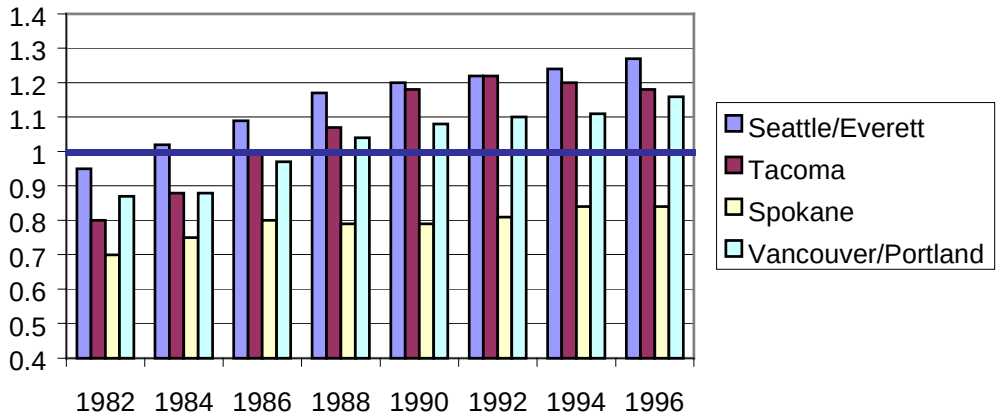
Vehicle Miles Traveled (VMT) is a measure of the total miles traveled by all vehicles in a given area during a specific time period. Increasing VMT on transportation facilities functioning near capacity increases congestion

Volume-to-Capacity (V/C) ratio is a measure of roadway demand and supply that compares vehicle volumes on roadways with the carrying capacity of the roads. A volume-to-capacity ratio

of 1.0 indicates that traffic is traveling at maximum design capacity of the facility, and thus the roadway is congested. As more vehicles enter the roadway, the average speed traveled on the roadway gradually declines. When the volume on a roadway reaches capacity, an incident could cause the VMT to drop as delays increase.

The *TTI Congestion Index* was developed by researchers at the Texas Transportation Institute as a way to estimate congestion on the freeways and principal arterials within an urbanized area. Based on volume-to-capacity ratios, this index is one of the few measures applied consistently across metropolitan areas. The index compares daily traffic per lane-kilometer with a judgment regarding the traffic level at which congestion begins. A value of 1.0 on this index indicates significant congestion for an urban area. In 1996, TTI ranked Seattle as the sixth most congested metropolitan area in the nation; Tacoma ranked 12th, and Spokane ranked 58th. While Washington's congestion is worst in the Seattle metropolitan area, the rate of increase in congestion has been greater in Tacoma and Vancouver over the last 15 years (see Figure 1).

Figure 1: TTI Congestion Index for Seattle-Everett, Tacoma, Spokane, and Vancouver



Source: Texas Transportation Institute, 1998.

WHAT CAUSES CONGESTION?

Efforts aimed at solving the congestion problem should begin with an understanding of its causes. The following section of this paper discusses four principal causes of congestion and five indirect causes.

Direct Causes

Factors that contribute directly to congestion include rapid population and job growth; more intensive use of automotive vehicles and a failure to expand transit usage; failure to build new roads; and failure to make drivers bear the full costs they generate.

Rapid Population and Job Growth

Population growth brings more people into the traffic flow on a fixed roadway system. As employment opportunities grow, more people travel to work during commuting times of peak-hour traffic. Between 1980 and 1990, Seattle's population grew by about 23 percent, and other areas around Washington also experienced significant growth. As shown in Table 1, planners expect continued rapid population and job growth in Washington's urban counties over the next two decades, with particularly high growth expected in Snohomish, Clark, and Kitsap Counties.

Table 1: Regional Population and Employment Forecasts by County

County	Population			Employment		
	1990	2020	Change	1990	2020	Change
King	1,507,319	2,030,674	35%	969,001	1,439,148	49%
Kitsap	189,731	337,602	78%	79,300	126,292	59%
Pierce	586,203	916,848	56%	227,300	350,513	54%
Snohomish	465,642	836,992	80%	162,100	289,851	79%
Puget Sound Region	*2,748,895*	*4,122,116*	*50%*	*1,437,701*	*2,205,804*	*53%*
Clark	238,053	425,502	79%	121,700	206,273	70%
Spokane	361,364	547,959	52%	162,700		

Source: Medium Series from OFM Forecast Estimates (1995) and Metropolitan Transportation Plan. Note: Clark County Employment forecast is for 2017.

More Intensive Use of Motor Vehicles and Failure to Expand Transit Usage

The number of vehicle miles traveled has grown at a much faster rate than population or employment. Many factors have contributed to more intensive use of automobiles including increased trips as more women have worked outside the home since the 1970s. Suburbanization of housing and employment has increased trip lengths, and decreased average household size generates more total trips from the home for shopping and other errands. As growing wealth has increased auto ownership rates, average auto occupancy and transit use have decreased. These factors have combined to make increases in auto travel outpace population growth.

Failure to Build New Roads

During the recent period of dramatic expansions in vehicle ownership and intensity of use, road development did not follow this trend. In the last two decades, growth in total daily vehicle miles traveled has substantially outpaced increases in centerline road miles in Washington's major urban centers, including the Vancouver/Portland area, the Spokane metropolitan area, and the Puget Sound region.

Failure to Make Drivers Bear the Full Costs They Generate

Automobile drivers bear most of the costs of vehicle ownership. They pay for the purchase, insurance, maintenance, and gas for the vehicle, as well as for their time spent commuting; their gas taxes pay for much of the road wear-and-tear their cars cause. But drivers do not pay the full added cost of driving during peak periods. Most importantly, drivers do not pay the cost of the additional delay that their entry imposes on all other drivers on congested roads. By entering an already-congested roadway, a driver slows every vehicle nearby. Travelers bear their own congestion costs (the delay that they experience) but not the costs of the increased congestion that they impose on others around them (the cumulative total cost of the delay that they add to everyone's travel times). For most solo drivers, the benefits of commuting during peak hours outweigh the *private* costs that they bear of waiting in traffic. If they had to pay for all of the congestion costs that they impose on others, however, some would choose not to drive alone. In addition to the costs of congestion, autos can also impose other costs that drivers do not have to pay directly, including some portion of pavement wear-and-tear, some parking costs, uninsured accident expenses, noise, and environmental pollution.

Long-term (or Indirect) Causes of Congestion

Several additional factors do not directly increase congestion, but they reinforce or encourage trends that have a direct effect on traffic. Such indirect causes include concentration of work trips in time; desire to choose where to live and work; desire for low-density neighborhoods; preference for low-density work places; and desire to travel in private vehicles. These issues are basically behavioral or cultural in nature, and they drive people's travel patterns. Accordingly, they will require significant effort and time to change (if that is desirable) or be accommodated.

Concentration of Work Trips in Time

Since most companies and organizations begin their workdays at about the same time, many work trips are concentrated in a relatively short period of time. These trips mainly occur in the morning between 6:00 and 9:00 a.m., and in the evening between 4:00 and 7:00 p.m. Companies currently may suffer only from the time loss that their employees experience while commuting during these times, but they do not bear the costs that their peak-hour travel imposes on other firms and workers. If firms had to pay the full costs associated with their work patterns, they might put more effort into adjusting work hours around peak periods. Placing a price on travel during peak hours could correct this socially inefficient allocation of resources. Additionally, many non-work trips occur close to commuting periods as people take their children to school or run errands before or after work, further adding to peak-hour congestion.

Desire to Choose Where to Live and Work

Many commuters are willing to travel long distances so that they can work and live where they want, even if that means wasting time in heavy traffic. The further away they live from where they work, the more drivers contribute to congestion during peak periods. Attempts to shorten commuting times have often failed because many people prefer to live in large single-family homes in communities located far from the perceived negatives of the city.

Desire for Low-density Neighborhoods

Rooted in the American dream itself, a goal for many individuals is to own a single-family detached home with a yard. Manifesting this desire mandates housing spread over a large area, which is contrary to land use planning goals of higher-density neighborhoods. In recent decades, many Americans have moved from higher-density city neighborhoods to surrounding low-density suburbs. This trend also appears on a national scale, as U.S. residents have moved from denser metropolitan areas in the Northeast and Midwest to the less populated South and West. Because suburbs have lower densities than the metropolitan areas they surround, they generate more travel per resident than the higher-density areas. The fastest-growing suburbs are typically at the edge of metropolitan areas. The trend towards low-density neighborhoods may change as the baby-boom generation ages, and the preferences of some households shift towards denser communities that combine residences with office and retail areas and offer urban amenities.

Preference for Low-density Work Places

Along with the trend towards low-density housing, many suburbs require office and retail facilities to be located in low-rise buildings, rather than the higher-density development typical of downtown in a city. Suburban office space generally costs less than in urban centers, which encourages firms to relocate from downtown to lower-density office parks. Many residents and workers enjoy the free adjacent ground-level parking and the landscaping in such low-density

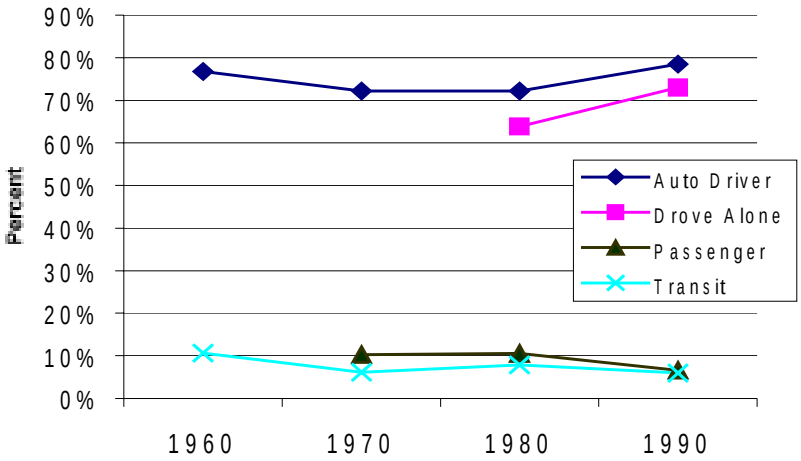
work areas. As more jobs are created in suburbs and away from downtown, the distance to work often increases and adds to traffic congestion.

Dispersal of jobs and residences diminishes the effectiveness of mass transit, carpooling, vanpooling, and other ride sharing. Transit is efficient only if passengers converge at large centers at the beginning or end of their trip. The increased time it takes to reach a transit center or a carpooler's home typically reduces the efficiency of such commuting options by decreasing the time savings. However, such travel modes can offer other advantages, including the ability to read or work during the commute, opportunities for social interaction, and reduced stress.

Desire to Travel in Private Vehicles

The convenience, comfort, privacy, and speed gains over public transit make commuting alone in private vehicles preferable for many people. In the United States, more people choose to ride in private vehicles than ride public transit. Journey to work data for the Puget Sound region supports this conclusion, though data are not available for other areas of the state. Figure 2 below illustrates the increased dependence on automobiles for travel to work in the Puget Sound region, as well as an increase in numbers of people driving alone. It also shows the decline in transit ridership over the past 30 years. Data since 1990 indicate that transit's mode share for the journey to work has held constant at about 7.5 percent. Persuading drivers to use other travel modes would involve making the benefits of solo driving less than the benefits of other modes. However, policies that increase the benefits of other modes or decrease the benefits of driving alone can be challenging, expensive, and politically unpopular.

Figure 2: Journey to Work in the Puget Sound Region



Source: U.S. Census data, Puget Sound Regional Council.

CONGESTION IN WASHINGTON: CURRENT AND FUTURE

Policymakers have not reached consensus on what constitutes an appropriate level of congestion. Some congestion is a probably a good thing, as it means that we have vital urban areas and make regular use of the large public investments in roads. Roads that never operate near their capacity represent underutilized capital resources. In transportation planning under the state Growth Management Act, jurisdictions set their own standards for levels of service depending on their policy objectives.

Current Conditions

Central Puget Sound Region

U.S. Department of Transportation data on person-hours of delay in Seattle show a dramatic increase over a 12-year period, almost fourfold, from 130,000 person-hours of delay in 1982 to almost 400,000 person-hours in 1994. Data on congestion from the Texas Transportation Institute show a significant gap between increases in traffic volume and road capacity in the Seattle/Everett area since the early 1980s. While congestion is serious and getting worse over time, it is localized to certain segments of the road network at specific times of day. Despite high levels of congestion on parts of the freeway system during rush hour, a significant portion of the network remains uncongested. Data from the Puget Sound Regional Council shows that in 1995 only 6.1 percent of the overall road network experienced congestion during the afternoon peak and approximately 20 percent of the freeway network.[2] PSRC models show this problem getting worse, but many people are able to schedule their trips and routes to avoid the most congested parts of the network and times of day.

Clark County

As part of the greater Portland metropolitan area, Vancouver and surrounding Clark County have experienced rapid increases in road use accompanied with much slower growth in road capacity. Data from the Texas Transportation Institute show that the number of vehicle miles traveled in the Vancouver/Portland area has doubled since 1982, a rate that exceeds that of the central Puget Sound region. As a result of this growth, the TTI congestion index for the area increased more rapidly than in central Puget Sound, though not to the same absolute level (see Figure 1).

Spokane County

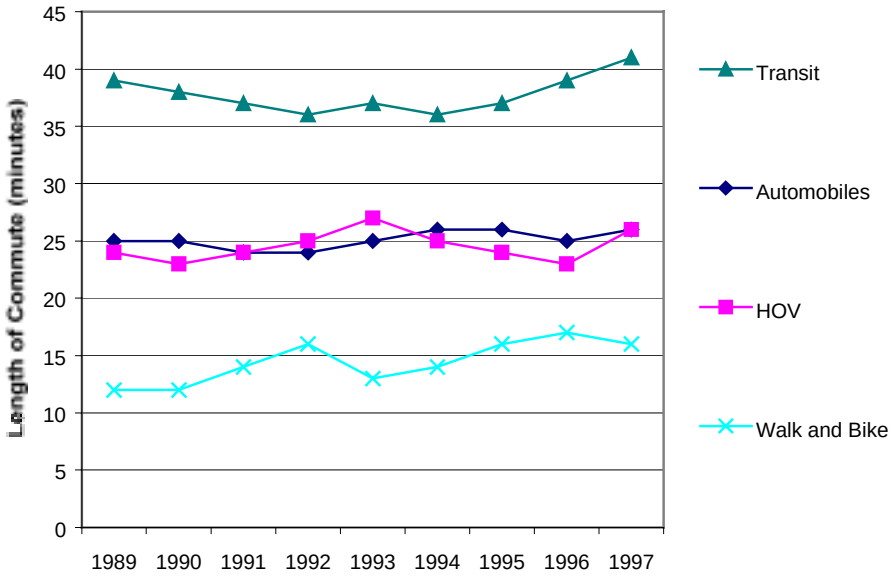
Spokane County has also experienced increases in traffic relative to its road capacity. While the area's TTI congestion index remains below 0.9, the trend line is towards increasing levels of congestion (see Figure 1).

Commuting Paradox

A recent report shows that despite increased congestion, people in the Puget Sound region have adjusted their behavior to maintain constant commuting times. The average commute time has remained virtually constant over the last ten years despite a considerable increase in regional population and total vehicle miles traveled. The evidence suggests that as employment grows faster in centers outside the central cities, workers select jobs, residential locations, or both in a way to maintain an acceptable commute. People who have made the same commute over the past decade have noticed increased congestion as new employment and residential locations result in new trip patterns. The increased use of flextime and the higher proportion of part-time jobs enable more commute trips during hours outside the traditional "rush" hours, stretching the duration of peak congestion but reducing its severity. Figure 3 shows the trends in travel time for automobiles, transit, and non-motorized travelers over the last decade.

[2] *Draft Six Year Action Strategy*, Puget Sound Regional Council, 1998

Figure 3: Mean Commute Time in Puget Sound Panel Survey



The relatively flat trends in travel time in the Puget Sound region are not unique to this area. Despite increased congestion over time, average work trip duration has changed little across the country. National and local data reveal that the average commute time for individuals over the last several decades has been about 22 minutes. This apparent paradox is actually consistent with land use patterns. Suburbanization creates dispersed metropolitan areas with alternative employment centers and multiple residential neighborhoods. Commuters then make rational choices about the location of their homes relative to where they work, though these decisions can be more difficult for households with more than one commuter. When commute times become excessive, drivers can move to a location that reduces the congestion they experience.

Future Conditions

Vehicle use is unlikely to continue to exceed population growth at the rate of the last two decades, due to changes in the underlying causes. For example, another baby-boom generation of drivers is not expected, and growth in the percentage of women obtaining driver's licenses should level off. As the ratio of vehicle ownership to licensed drivers approaches 1.0, the rate of increase in congestion will slow because each person can only drive one vehicle at a time. However, this does not mean that congestion will not get worse – population growth will still drive increases in congestion. Evidence also suggests that drivers will continue to use automobiles more intensively, especially if in the future, women drive as much as men and the average miles driven per vehicle continue to rise.

According to current trends in population, employment, and vehicle usage, congestion in Washington State will worsen. Without serious plans to mitigate congestion through additions to the transportation system, demand management techniques, or both, the delay experienced during peak hours will continue to rise. The Puget Sound Regional Council forecasts that twice as much of the regional road network will have congestion in 2020 as today, even with planned investments in road and transit capacity. With this increased congestion, it is likely that businesses and households will continue to make location decisions and adjust their travel

behavior to avoid congestion to the extent possible. As a result, the region is unlikely to see significant changes in commuting times. Though Puget Sound currently experiences the state's highest congestion levels, similar patterns are expected for other urban centers in Washington.

OVERVIEW OF POTENTIAL SOLUTIONS

In the United States in the post-war years, the typical solution to congestion has been to add more transportation capacity, principally roads. Other supply-side solutions to relieve congestion include variations on adding road capacity, such as limiting a new lane's use to high-occupancy vehicles, improving signal timing to increase the throughput of an existing road, and providing information on alternate routes so drivers can avoid excessive delays. Supply-side solutions also include adding transit capacity such as rail or buses.

As transportation planners have confronted the financial and physical limits of adding transportation capacity over the last 20 years, they have begun to adopt strategies to encourage the more efficient use of existing investments in roads and transit. These demand-side strategies include charging variable tolls on congested facilities to ration scarce road capacity, providing financial incentives to take transit or carpool instead of driving alone, making auto travel more expensive, and encouraging higher density land uses.

This overview provides a brief discussion of various proposals to alleviate congestion. Separate background papers on each topic provide a more detailed discussion of the proposed policy and its performance on evaluative criteria.

Supply-side Solutions

Build New or Additional Roads

Adding roads will not eliminate congestion in urban areas because latent demand tends to recongest new road capacity. Latent demand comes from four sources. First, travelers from alternate routes will use the new road because it offers faster service to their destination. Second, people who avoided congestion by driving during the off-peak period will now use the new road during peak periods. Third, some people who previously carpooled or rode the bus will decide they can now drive alone on the new road. Finally, over time, some people will change where they live, work, and shop in ways that use the new road capacity. These four factors combine, sometimes quite quickly, to cause congestion on the new road capacity.

While adding road capacity will not prevent congestion during peak periods, it can reduce the levels of congestion below what would occur without the investment. Road capacity improvements will tend to reduce congestion on alternate routes and narrow the duration of congestion, at least in the short term. However, building new roads in urban areas is expensive, and any mobility benefits must be balanced against the costs. In recent decades, transportation planners have encountered local opposition to adding more road capacity because of its effect on neighborhoods and due to the tax increases needed to pay for more roads.

Add High-Occupancy Vehicle Lanes

The Puget Sound region has a partially completed network of High-Occupancy Vehicle (HOV) lanes, commonly known as carpool lanes, on the highway system that allow buses and vehicles with two or more people to travel in designated lanes. HOV lanes are not intended to solve the congestion problem in general-purpose lanes. Rather, they give buses and carpools a speed

advantage over single-occupant vehicles during congested conditions, and thereby create an incentive for taking transit or carpools. Under proper conditions, HOV lanes can increase the people-moving capacity of a corridor. HOV lanes generally have public support in Washington State, but they annoy some citizens who perceive that they result in wasted road capacity. The problem with HOV programs, they argue, is that the allocation mechanism is extremely imprecise. Because of the size and the political difficulty of the jumps between one-, two-, and three-person minimums, the use of HOV lanes inevitably results in the under-use of large amounts of valuable capacity.

Employ High-Occupancy/Toll Lanes

This solution would convert current High-Occupancy Vehicle (HOV) lanes to High-Occupancy/Toll (HOT) lanes, or add new HOT lanes. HOT lanes allow single-occupant vehicles to pay to use an HOV lane and travel more quickly than they could in the neighboring congested lanes. The price of using the HOT lane is kept high enough to prevent overloading of the lane, ensuring high travel speeds for transit, carpools, and those willing to pay the toll.

This concept, also called value pricing, provides highway users with a choice of traveling in the "free" congested lanes or paying a premium to travel in an uncongested lane. When used to provide new road capacity, HOT lanes can enable users of a highway facility to pay the cost of the service they use, which varies by corridor and time of day. Revenues from HOT lanes can provide funding for road enhancements without an increase in the gas tax or other less direct methods of financing. Recent advances in technology can make toll collection and monitoring on a roadway automatic and significantly less expensive than previous systems.

For those vehicles willing to pay a toll, HOT lanes address the congestion problem in congested corridors. They also provide a source of funding for capacity additions. An early HOT lane proposal in Washington State encountered political opposition, but facilities operating in California and Texas have been generally popular. Adding tolls to existing "free" facilities is typically unpopular, but HOT lanes can provide a successful way to add new road capacity.

Expand Bus Transit

This solution would add more bus transit services to the most congested regions in the state. Adding bus capacity in highly congested corridors will not eliminate the congestion problem for car drivers, but it does provide an alternative to driving in congested conditions, especially when combined with an integrated HOV system. Substantial evidence suggests that bus transit is unable to attract a significant share of riders, as the option of driving alone is more attractive to the majority of travelers. However, transit systems can provide a reliable alternative to congested roadways.

While adding buses may not solve congestion, buses do provide enhanced mobility for travelers. More people are able to travel to more places, even in congested conditions. Bus systems can be cost-effective, especially in comparison with other transit investments such as fixed rail. The industry requires significant financial subsidies, however, and it has experienced a decline in productivity since the 1960s. As discussed in the roads section above, latent demand may result in more cars taking the place of those that transit removes from the roadway.

Expand Rail Transit

This solution would add more passenger rail capacity to the most congested regions in the state. It would also involve modification of bus transit to optimize rail performance. The proposal

would include capacity additions that are part of current plans, such as those adopted by Sound Transit in central Puget Sound, as well as additional capacity enhancements not yet underway. In the short term, the implementation of rail transit is unlikely to result in any reduction in levels of congestion. Rail transit provides an alternative mode of travel to congested roadways, but it is not likely to reduce congestion on those roads significantly.

In areas with high population density, like New York City, rail transit can be a highly cost-effective transportation mode and, with buses, can carry more than half of work trips. Even in dense urban areas, however, roads remain congested, and transit is not a congestion solution as much as an alternative to traveling by car. Other benefits associated with light rail may make it attractive to cities regardless of its impacts on congestion. Potential benefits include the following: 1) cities may consider it a path to increased density, which they wish to pursue for reasons other than reduced congestion; 2) rail may be viewed as a source of localized benefits to certain neighborhoods; and 3) rail may serve as a source of civic pride.

Employ Intelligent Transportation Systems

This solution would implement Intelligent Transportation Systems (ITS) in all urban areas of the state to increase the efficiency of existing road capacity. This proposal includes freeway on-ramp metering and signal timing, as well as systems to monitor traffic flow, measure congestion, detect incidents, and disseminate information to the public. ITS can communicate real-time traffic and transit information to the public via internet connections, variable electronic message signs, Highway Advisory Radio, or other means. Washington State has been a leader among states in implementing several intelligent transportation systems, especially in the congested central Puget Sound region.

Potential benefits of ITS can include improved safety, reduced congestion, better access to travel information, and decreased environmental impacts. Better reporting of traffic incidents, faster emergency response, and monitoring of roadways contribute to improved safety on roadways. ITS has the potential to enhance the capacity of the existing road network and provide some measure of congestion relief. Improved access to travel and transit information allows travelers to make informed decisions about when, where, and how to travel. Reducing stop-and-go driving through signal timing and other ITS measures can lower emission levels and fuel use.

Because ITS projects are so varied, it is difficult to make a blanket statement about their cost-effectiveness. The efficacy of ITS depends upon the level of implementation and the incentives it creates to encourage people not to drive alone. Some ITS programs can be quite expensive and their impact may be limited in scope. However, ITS tends to cost less than other forms of adding road capacity, and it generally enjoys higher public acceptability.

Demand-side Solutions

Use Road Pricing

This solution would charge motorists directly for using congested roads. Road pricing is a method of financing highways and reducing congestion by placing tolls on roads. To encourage people to travel in less congested times or via alternate means or routes, tolls vary with the level of congestion, time of day, or length of trip. Electronic toll collection now enables road pricing without motorists having to stop at tollbooths or even slow down. Eligible roadways in Washington could include most of the limited-access highways in the Puget Sound region and other congested highways elsewhere in the state, such as the Vancouver and Spokane areas.

Without good information about the costs that they impose on others, drivers tend to overuse roads, causing congestion. Congestion pricing seeks to make drivers using a road or bridge pay a fee for the cost of the delay they impose on others during peak hours of use. Rather than make all users pay for road use regardless of when and where they travel (as the gas tax does), congestion pricing allocates costs to the users of a specific facility at a particular time of day. Pricing road capacity has excellent long-term potential for reducing congestion. Because tolls vary to reflect current congestion levels, it is possible to maintain free-flow conditions on priced corridors. The extent of the congestion reduction, however, is limited to those lanes within the road network that are priced.

Road pricing is generally not popular. People are concerned about any new tax or fee, and critics argue that such fees will hurt the poor. Moreover, it is difficult to make commuters pay for something that is effectively free at present, especially when they already have made long-term decisions, such as where to live, on the basis of the current price structure for transportation.

Cash out Employer-provided Parking

This solution would require employers that offer their employees subsidized parking to offer employees the additional option of receiving the cash value of those subsidies should they choose not to drive alone to work. This solution would take advantage of recent changes in the federal tax code, and perhaps encourage further federal law changes, to reduce existing subsidies for single-occupancy vehicles. Under current federal tax laws, money that employers spend to provide employee parking is tax-exempt, but when employees pay for their own parking, no such exemption exists. As a consequence, most employers provide free or subsidized parking as a fringe benefit to their employees — a benefit that employees can take full advantage of only if they drive to work alone.

A program requiring employers to offer a cash-out option along with any offer of subsidized parking would likely have some immediate effect on rush-hour congestion. Uncertainty exists, however, regarding how strong those effects might be. Factors such as current land use patterns, the availability of transit, and the narrowness or breadth of the cash-out program will influence the program's effectiveness. While enacting cash-out legislation alone will not make congestion disappear, passing such a law represents a logical and relatively simple first step towards the proper alignment of financial incentives for drivers. Compared to other potential solutions to congestion, the costs of parking cash-outs are relatively small. Since the potential benefits are significant, such a program appears highly attractive in terms of its cost-effectiveness.

Adopt More Transportation Demand Management Policies

Cashing out employer-provided parking is one particularly cost-effective form of transportation demand management (TDM). This proposed solution includes other TDM measures to reduce commute trips, including such policies as encouraging employers to coordinate ride-sharing, stagger work hours, adopt flextime policies, support four-day workweeks, and promote telecommuting. Demand management measures do not eliminate congestion, and sometimes they accomplish less than expected. TDM policies that are most effective at reducing congestion are those that promote ride-sharing, but unfortunately they are also the most difficult to implement successfully. While cost-effective in comparison with many supply-side approaches to congestion reduction, TDM programs impose significant costs on employers and employees. Average Commute Trip Reduction (CTR) program costs were $52 per employee in 1997, and WSDOT estimated that CTR programs in Washington cost $21.2 million to implement in 1997.

Companies may bear the cost of having to create or encourage such programs, but they benefit from the increased reliability of travel times, loyalty, and productivity of their employees.

Raise the Gas Tax

This solution would increase fuel taxes paid at the pump. The Blue Ribbon Commission's Revenue Committee is considering this proposal as a possible way to increase funding for needed transportation investments. In addition, raising the gas tax can also be viewed as a demand-side strategy for reducing congestion; accordingly, the Investment Strategies Committee is investigating this aspect of a gas tax increase. Currently, Washington State levies a 23-cent per gallon gas tax, and the federal government levies an additional 18.4-cent tax on gasoline. This proposal would increase the gas tax by as much as 50 additional cents per gallon in an attempt to discourage people from driving.

A substantial increase in the gas tax would not have an immediate effect on rush-hour congestion. In the spring of 1999, gas prices increased by nearly 40 cents per gallon in Washington with no noticeable effect on congestion levels. The cost-effectiveness of the tax as a demand management tool is limited by the weak connection between a driver's use of gasoline and his or her contribution to congestion. In Europe, in spite of high gas taxes, many cities continue to face severe congestion problems. Little public support exists for using an increase in the state gas tax as a demand management strategy. Due to the heavy and visible burden it would place on people who contribute little or nothing to congestion, such a tax would likely have many vocal opponents.

CONCLUSION

None of the potential solutions performs well on all criteria. Road pricing is cost-effective and would have the most significant effect in reducing congestion, but it is politically unpopular. Other cost-effective strategies include some intelligent transportation systems and transportation demand management programs, which are relatively popular, but they have relatively small effects on overall congestion levels. Cashing out employer provide parking is one of the most promising demand management strategies.

Adding new capacity with roads or rail transit is expensive, and both modes have vocal opponents. Because latent demand tends to recongest new road capacity and replace the car trips that transit prevents, neither roads nor rail is likely to solve the congestion problem. Bus transit with HOV lanes can provide cost-effective transit service, but it will not substantially decrease congestion in general-purpose lanes because less than 10 percent of work trips in the Puget Sound region are made on buses and the figure is lower in other parts of the state.

High-Occupancy/Toll lanes are a promising strategy for pricing new or existing road capacity. HOT can provide motorists with an alternative to driving in congested conditions, while also creating a funding source for capacity enhancements. Though recent proposals for HOT lanes in Washington State drew opposition, they have proven popular in other parts of the United States.

The two following tables provide a graphic presentation of the performance of potential solutions on several evaluative criteria that closely parallel those that the Investment Strategies Committee adopted. The solutions are organized according to their efficacy in reducing congestion. The tables include solutions in addition to those discussed in this report to provide context and to offer a more comprehensive list of potential policies. Many of the land use-related policies are discussed in a separate paper on land use and transportation.

Table 1: Supply-Side Solutions to the Congestion Problem

Policy	Effectiveness		Costs		Implementation	
	Extent	**Impact**	**Direct to Commuters**	**To All Society**	**Required Institution**	**Ease of Administration**
Rapidly removing accidents	Variable	Great	None	Minor	None	Easy
Building high-occupancy/toll lanes	Variable	Great	Great	Moderate	None	Moderate
Improving highway maintenance	Broad	Moderate	None	Moderate	None	Moderate
Intelligent Transportation Systems: coordinating signals, TV monitoring, ramp signals, electronic signs,	Variable	Moderate	None	Minor	None	Moderate
Building added HOV lanes	Variable	Moderate	None	Great	Cooperative	Easy
Building new general purpose lanes	Variable	Moderate	None	Great	Cooperative	Moderate
Upgrading city streets	Variable	Moderate	None	Moderate	None	Easy
Building new off-road transit systems (rail and dedicated busways), extending existing ones	Narrow	Moderate	Minor	Great	Cooperative	Hard
Increasing public transit usage by improving service, amenities	Narrow	Minor	None	Moderate	None	Hard

Source: From Anthony Downs, *Stuck in Traffic* (1992), and ECONorthwest. Policies in italics addressed in sections of this report.

Table 2: Demand-Side Solutions to the Congestion Problem

Policy	Effectiveness		Costs		Implementation	
	Extent	**Impact**	**Direct to Commuters**	**To All Society**	**Required Institution**	**Ease of Administration**
Instituting peak-hour tolls on main roads	Broad	Great	Great	None	Regional	Moderate
Parking tax on peak-hour arrivals	Broad	Great	Great	None	Regional	Hard
Parking cash out	Broad	Great	None	None	Regional	Moderate
Eliminating income tax deductibility of providing free employee parking	Broad	Great	Great	None	Cooperative	Moderate
Increasing gasoline taxes	Broad	Moderate	Great	Moderate	None	Easy
Keeping densities in new growth areas above minimal levels	Broad	Moderate	None	Minor	Regional	Hard
Encouraging formation of TMAs, promoting ride sharing	Narrow	Moderate	None	Minor	Cooperative	Hard
Encouraging people to work at home	Broad	Minor	None	None	None	Moderate
Staggering working hours	Variable	Minor	None	None	Cooperative	Moderate
Clustering high-density housing near transit station stops	Narrow	Minor	None	Minor	Cooperative	Hard
Concentrating jobs in big clusters in areas of new growth	Narrow	Minor	None	Great	Regional	Hard
Increasing automobile license fees	Broad	Minor	Moderate	Minor	None	Easy
Improving the jobs-housing balance	Broad	Minor	None	Moderate	Regional	Hard
Adopting local growth limits	Narrow	Minor	None	Minor	None	Easy

Source: From Anthony Downs, *Stuck in Traffic* (1992), and ECONorthwest. Policies in italics addressed in sections of this report. Land-use policies addressed in separate paper.